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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: RIBBED MODULE, SECURITY SIGN AND SECURITY BARRIER SUBMERGENCE SYSTEM

(57) Abstract: A ribbed module, security sign and security barrier submergence system to buoy and submerge structures for use with a module having a buoyant structure so that a single module or a plurality of modules nested together can be ballasted to a particular depth in any body of water, regardless of the temperature, salinity or other physical/chemical composition of the water.



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PATENTSIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

5 TITLE: RIBBED MODULE, SECURITY SIGN AND
SECURITY BARRIER SUBMERGENCE SYSTEM

INVENTOR: DENNIS SMITH

SPECIFICATION

10 Cross Reference to Related Applications

This application claims the benefit of U.S. Provisional
Application No. 60/252,803 filed November 22, 2000.

15 The ribbed module, security sign and security barrier
submergence system of the present invention relates to
apparatus and methods to buoy and submerge structures for use
in different bodies of water.

20 The disclosures of U.S. Patent Nos. 5,879,105 and DES.
403,780, and application Serial No. 60/249,853 filed November
17, 2000 are incorporated herein by reference. The named U.S.
patents are assigned to Wave Dispersion Technologies, Inc.
(WDT), and recorded at Reel 010968, Frame 0101. The inventor
for the present application is the President of WDT.

OBJECTS AND SUMMARY OF THE INVENTION

25 It is an object of the present invention to provide a
submergence system for use with a module having a buoyant
structure so that a single module or a plurality of modules
nested together can be ballasted to a particular depth in any
body of water.

5 It is an object of the present invention to provide a
submergence system for modules, security signs and security
barriers consisting of the plurality of these modules, which
system is easily employed in any body of water regardless of
the temperature, salinity or other physical/chemical
10 composition of the water.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present
invention, reference may be had to the following description of
15 exemplary embodiments of the present invention considered in
connection with the accompanying drawings, of which:

FIG. 1 is a top perspective view of a ribbed module having
a submergence system according to the present invention;

FIG. 2 is a bottom perspective view thereof;

FIG. 3 is a top perspective view of a plurality of ribbed
modules arranged for a security sign, security barrier, or
25 marine wildlife refuge having the submergence system according
to the present invention;

FIGS. 4 and 5 are views of the ribbed module and a flow of
fluid for the submergence system of the present invention; and

FIG. 6 is a view of mounting features for the ribbed
module having the submergence system according to the present
invention.

Fig. 7 is a view of an assembly of buoyant modules having
35 an anchor and topped by rolled barbed wire.

5 Fig. 8 is a view of an assembly of buoyant modules similar to Fig. 7, topped by strung barbed wire and having mounting posts for signage.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

10 Referring to FIGS. 1-6, a ribbed module with a submergence system according to the present invention is shown generally at 10. The module is part of the Whisprwave® system owned by Wave Dispersion Technology, Inc.

15 The module 10 is formed from two halves 12, 14 joined together as in FIG. 6. Each half includes at the top portion an inlet nozzle 16, 18 and a brass fitted compressed gas inlet nipple 20, 22 with a plastic protective sheath. At an opposite side of the module 10, for each corresponding half 12, 14, there is a one way valve fitting 24, 26. The operation of the submerging system is designed to prevent having to
20 disconnect the module 10 or dispersion system 100 (FIG. 3) during the winter because the module must be submerged below the freezing level or be removed from the water. Removing the module from the water is time-consuming and expensive. The alternative would be to "bubble" the system 100. The module/
25 system may also be submerged when the location that the module/system is to be used in must be used for surface activities or emergency boat traffic.

30 The present invention is a submerging system for the Whisprwave® in cold climates where it is going to be subjected to ice. In operation, when it is required to remove the system from the water's surface, the module 10 is filled with fluid, such as water, through the inlets 16, 18 at the top of the module as shown by arrows 28.

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The one-way valve fittings 24, 26 at the bottom of the module prevent water from escaping the module halves 12, 14. Hoses (not shown) can be connected to the fittings 16, 18 to fill the module with water.

10

A manifold (not shown) can be connected to a plurality of the modules 10 to fill the modules concurrently. The modules are filled with the water in which they are positioned or anchored. The Whisprwave® is then weighted down using for example a sandbag. Alternatively, a sinker is disposed on the anchor chain for the module 10, 100 so that when the Whisprwave® is filled with water, it will sink and that sinker will be adjusted to the desired depth. After the modules are filled with water, caps 30, 32 are threaded onto the inlets 16, 18 to seal off the module.

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The Whisprwave® will remain flooded and anchored beneath the ice layer during the winter, causing no harm to surface "traffic". There is no necessity to disconnect the Whisprwave® and remove it shoreside until spring. In the spring, before the algae blooms, and before boats are put into the body of water, the compressed gas inlets 20, 22 are connected to the pressure lines 34, 36, as shown in FIG. 5 and the module pressurized by introducing compressed air into the module 10. The fluid in the module is blown out through the one-way valves 24, 26.

The one-way valves 24, 26 are adjusted for a pressure to purge the fluid, but not blow apart or deform the module by over pressurizing with compressed air.

5 As soon as the pressurized gas flow is stopped, the one-way valves 24, 26 seat, and the module floats to the surface.

10 Only the ballast necessary to float the module is removed, so that the module floats to the surface. At the surface, the remaining ballast is pumped from the module.

15 Each one of the halves 12, 14 includes a fluid chamber in communication with the corresponding one of the fluid inlets, 16, 22, compressed gas inlets 20, 22, and one-way valves 24, 26. Ballast purged from the module by the compressed gas exits the one-way valves 24, 26 as indicated by the arrows 38 in FIG. 5.

20 Each one of the halves, 12, 14, as shown, is provided with its own separate discrete sidewall i.e. this preferred embodiment 10 does not share a sidewall between the halves. Therefore, each one of the halves, 12, 14 includes its own submergence system of the necessary inlet valve, one way outlet valve, and gas inlet so that, if required, only one half of a module needs to be ballasted.

25 FIG. 6 shows the mechanical fastening features of one of the ribbed modules 10 according to the present invention. As shown in FIG. 6, each one of the halves, 12, 14 is provided with keyway 40 and a keyway 42. The halves 12, 14 are joined together by seating the key in the keyway and twisting the halves so that the halves 12, 14 lock into position.

30 An alternate embodiment is formed as a single module having one chamber therein for controlling the ballast and buoyancy of the module which operates in a similar fashion.

5 Figs. 7 and 8 show embodiments of the submergence system
in schematic form. They have multiple layers of modules, the
height of which can be adjusted by the buoyancy in the lower
layers. The anchoring means 198 hangs from the lower layer of
modules. Fig. 7 shows barbed wire rolls on top of the
10 uppermost modules to act as a barrier. Fig. 8 shows strung
barbed wire hung on mounting posts or fence posts 192, which
can also be used to support a sign, 190.

15 It will be understood that the embodiments described
herein are merely exemplary and that a person skilled in the
art may make many variations and modifications without
departing from the spirit and scope of the invention. All such
modifications and variations are intended to be included within
the scope of the invention as described herein.

5 What is claimed is:

1. A submergence system comprising:

a plurality of like buoyant modules spaced along one horizontally disposed line;

10 each said module including front and back walls, top and bottom walls, spaced opposite side walls extending outwardly beyond the widths of the other said walls and a plurality of intersecting surfaces between said walls;

15 each said module including a plurality of outwardly extending yokes connected to and spaced about said walls, said yokes including passages for enabling attachment to adjacent spaced modules in said line;

a plurality of cables passing through respective yoke passages for securing said modules along said line;

20 anchor means connected to said line of modules for holding said line in a relatively fixed position;

25 at least one of said like buoyant modules comprising at least one fluid inlet and at least one gas inlet on said module,

at least one one-way outlet valve in the vicinity of said bottom wall of said module to purge said fluid but not deform said module,

5 at least one cap removably fixed to said inlet nozzle to
seal off said module,

a hose removably connectable to said inlet nozzle to fill
said module with fluid to submerge said assembly, and

10 a pressurized gas line removably connectable to said gas
inlet nipple to introduce compressed air into said module
to float said assembly.

15 2. The assembly of claim 1 including a plurality of like
buoyant modules spaced along a second horizontally disposed
line positioned below and interleaved with said one line, said
plurality of cables passing through respective yoke passages in
each said horizontal line of modules and connecting said lines
together.

20 3. The assembly of claim 1 including a plurality of like
buoyant modules spaced along a pair of parallel horizontally
disposed lines positioned below and interleaved with said one
line, said plurality of cables passing through respective yoke
passages in each said horizontal line of modules and connecting
said lines together.

25 4. The assembly of claim 1 wherein said anchor means is
connected to a cable passing through yoke passages.

5. The assembly of claim 1 wherein said modules include ribbed
outer surfaces.

5 6. The assembly of claim 2 including a display device mounted on an upper wall of said one line of modules.

7. The assembly of claim 3 including a plurality of like buoyant modules spaced along a fourth horizontally disposed line positioned below and interleaved with said pair of
10 parallel horizontally disposed lines, said one and fourth lines being spaced and aligned vertically, said plurality of cables passing through respective yoke passages in each said horizontal line of modules and connecting said lines together.

8. The assembly of claim 4 including a barbed wire fence
15 mounted on an upper wall of said one line of modules.

9. The assembly of claim 4, wherein each module includes four yokes positioned at upper and lower corners thereof, the lower corners of said modules in said one line being connected to
20 respective upper corners of said pair of lines below and interleaved with said one line, the upper corners of said modules in said fourth line being connected to respective lower corners of said pair of lines.

10. A buoyant module for use in a submergence barrier system comprising:

25 front and back walls, top and bottom walls, spaced opposite side walls extending outwardly beyond the widths of the other said walls and a plurality of intersecting surfaces between said walls;

30 each said module including a plurality of outwardly extending yokes connected to and spaced about said walls,

5 said yokes including passages for enabling attachment to adjacent spaced modules in said line;

 at least one fluid inlet and at least one gas inlet on said module,

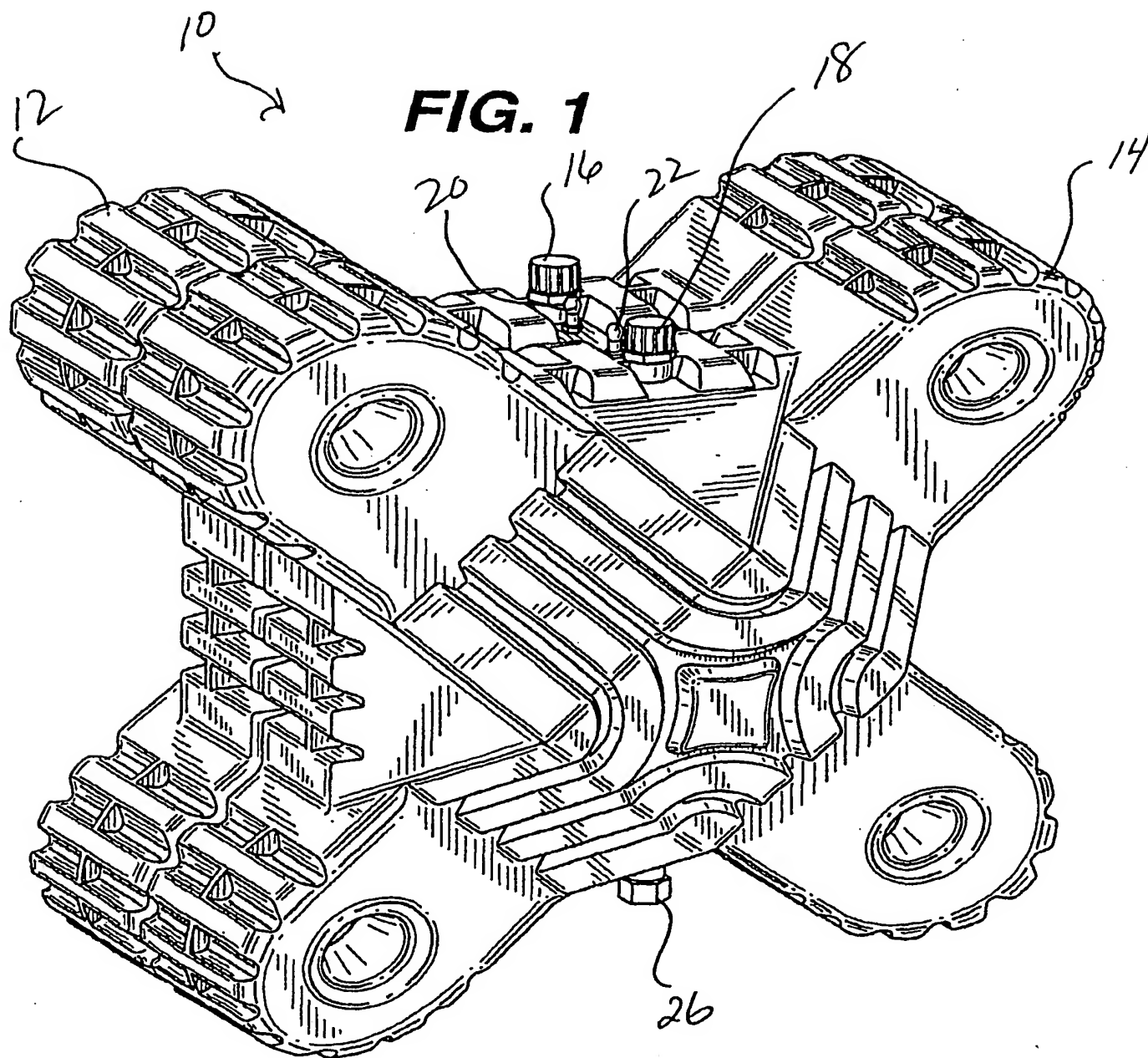
10 at least one one-way outlet valve in the vicinity of said bottom wall of said module to purge said fluid but not deform said module, and

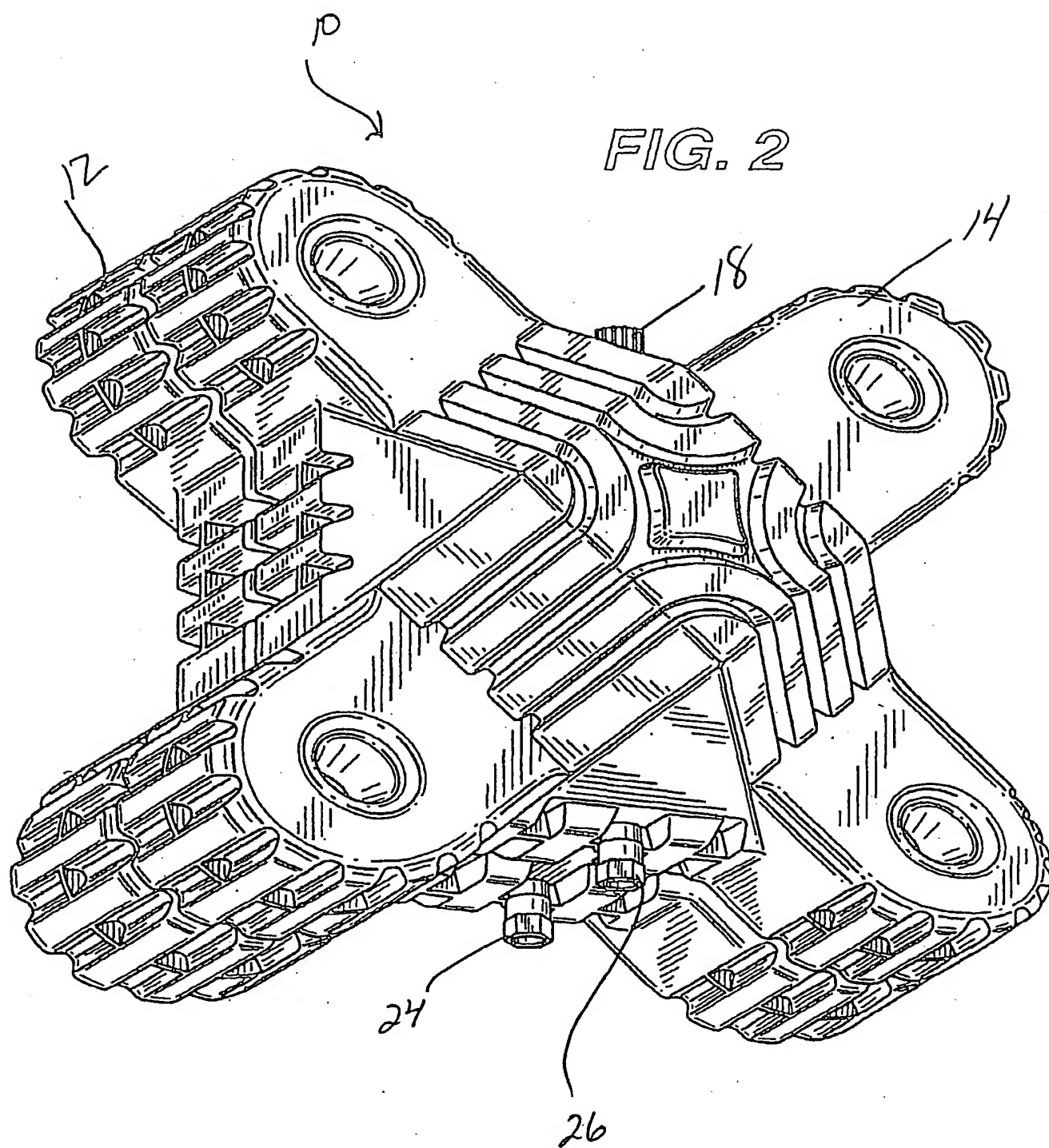
 at least one cap removably fixed to said inlet nozzle to
15 seal off said module.

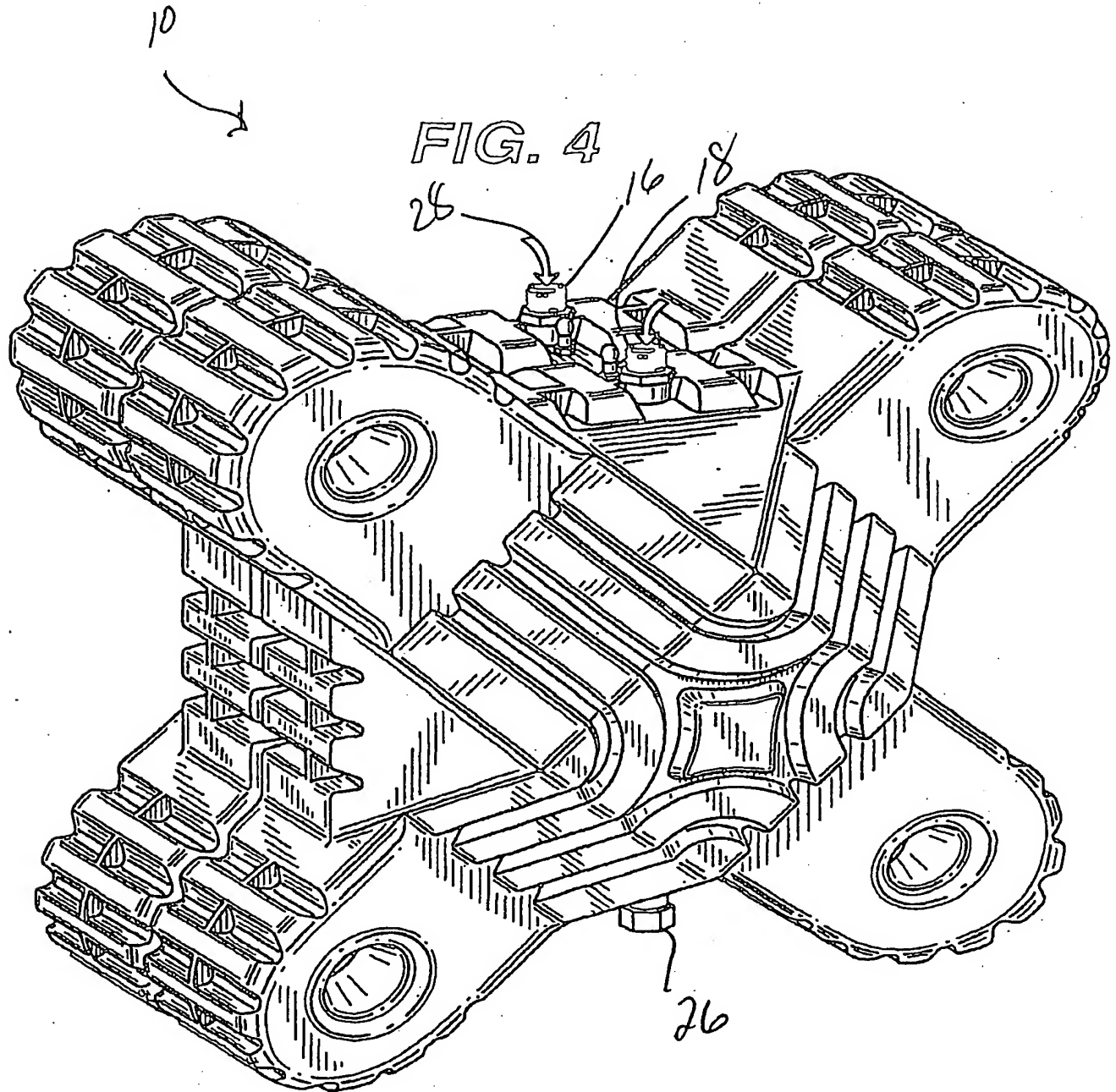
11. The module of claim 10 wherein said module includes ribbed outer surfaces.

12. The module of claim 10 further comprising two separate sealable su-modules connected to form a unitary module.

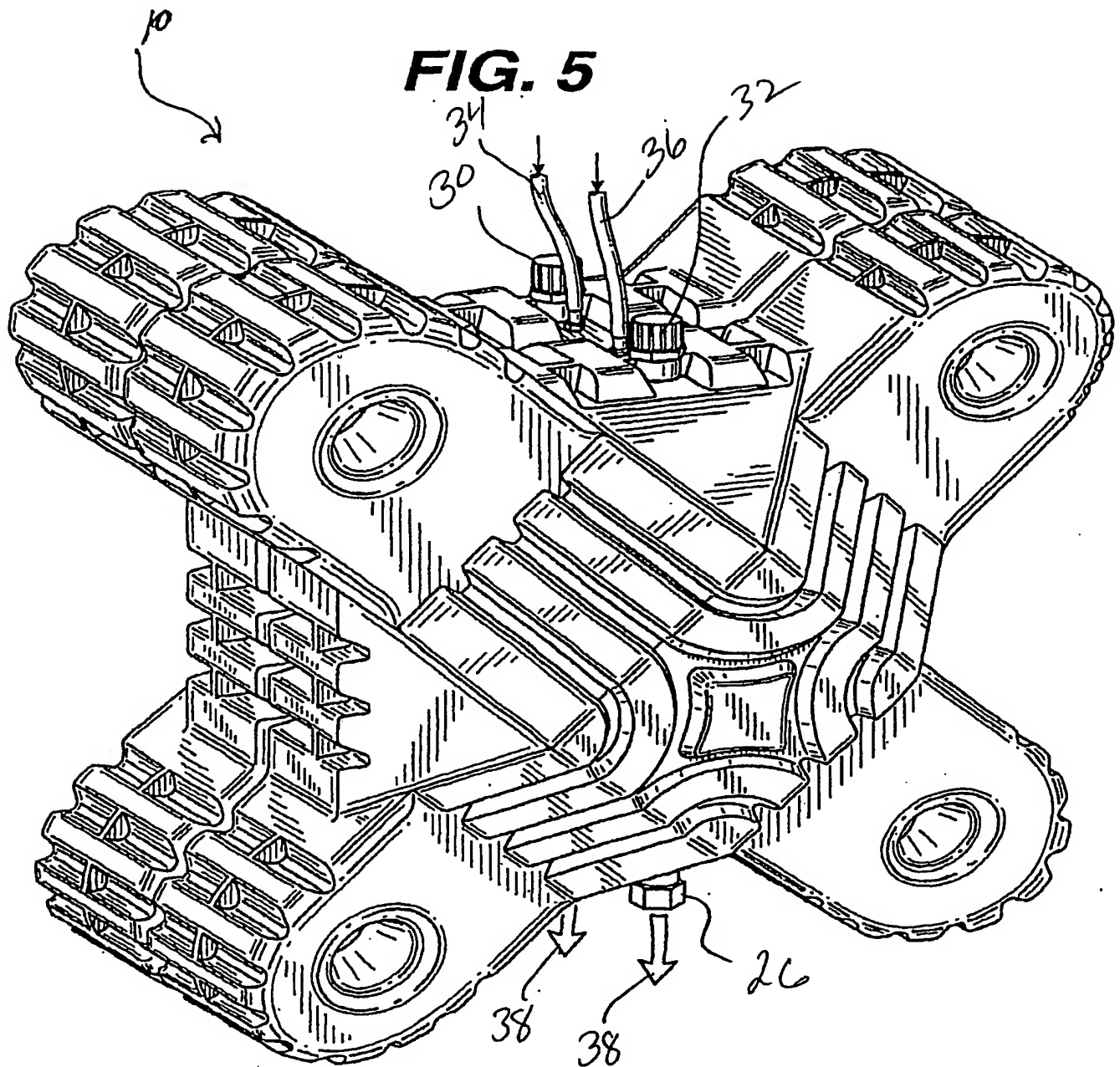
20 13. The module of claim 12 wherein at least one of said sub-modules includes a fluid and gas inlet and a fluid outlet.





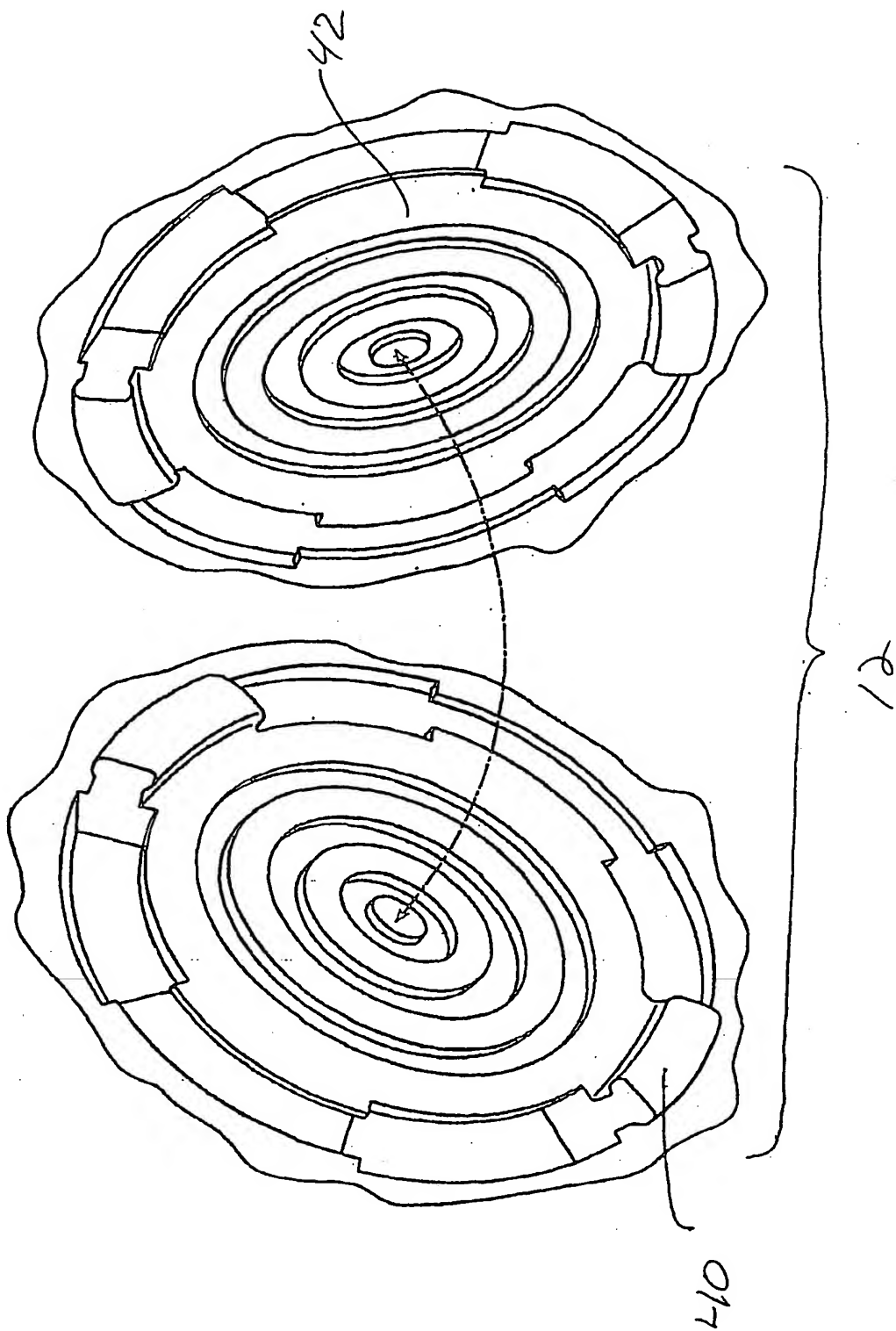


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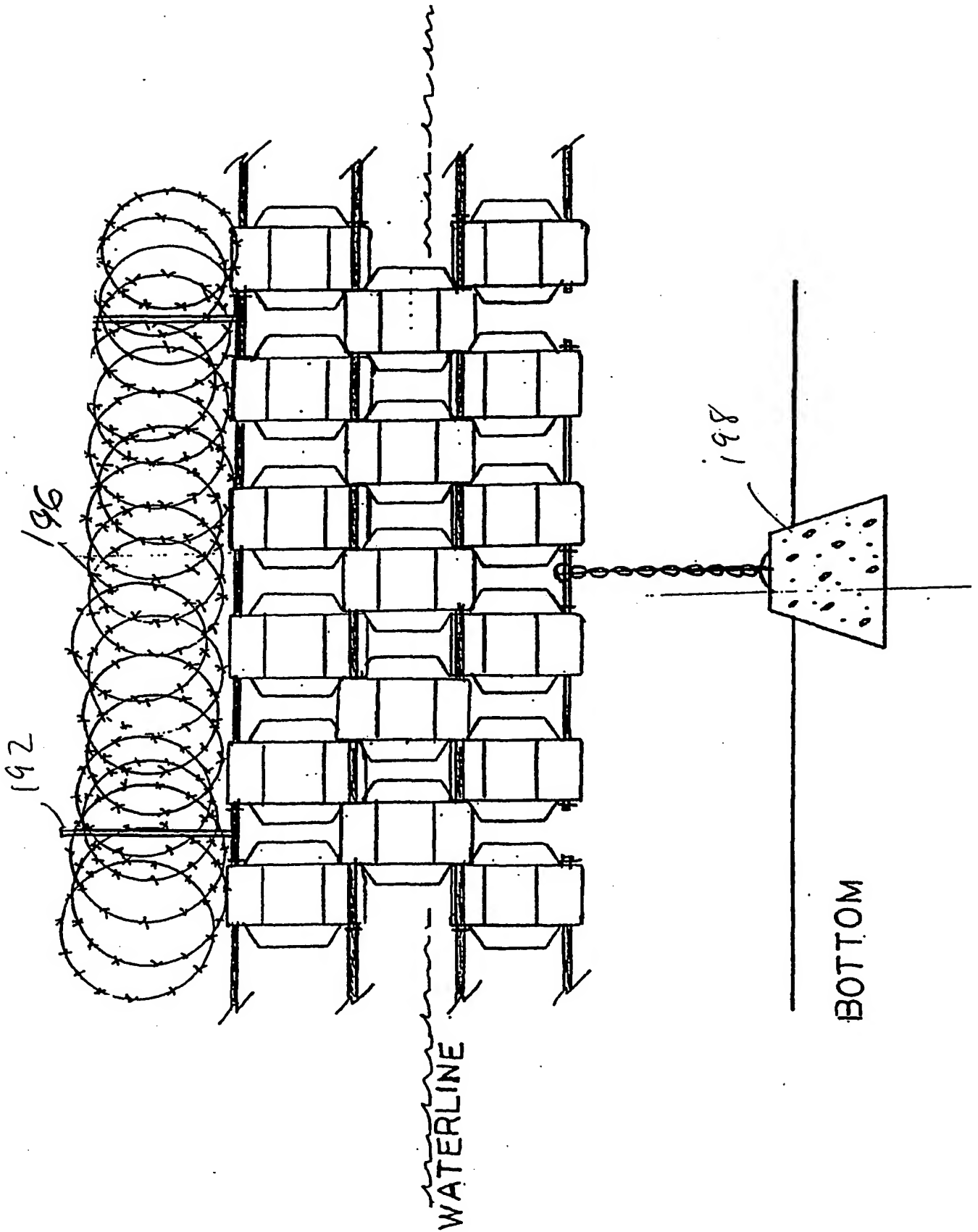
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FIG. 6



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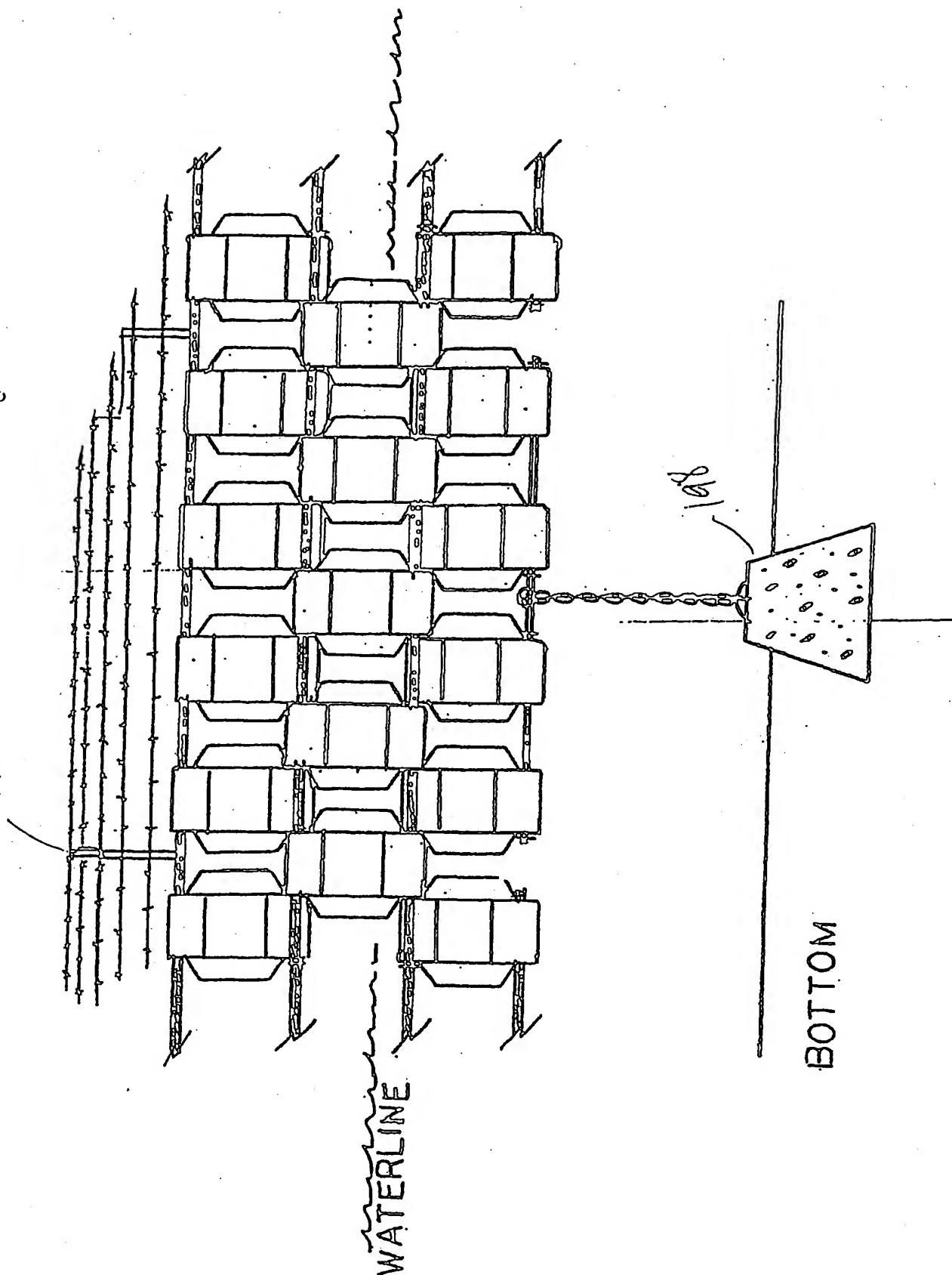
FRONT VIEW FIG 7



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FRONT VIEW
Fig. 8

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CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

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— with international search report

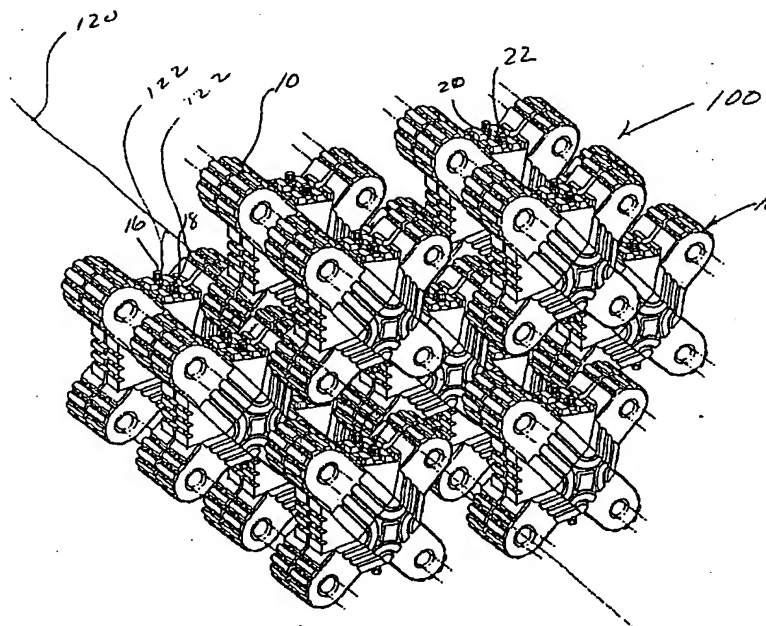
(74) Agents: WEINGRAM, Edward, R. et al.; Weingram & Associates, P.C., 197 West Spring Valley Avenue, P.O. Box 927, Maywood, NJ 07607 (US).

(88) Date of publication of the international search report:
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: RIBBED MODULE, SECURITY SIGN AND SECURITY BARRIER SUBMERGENCE SYSTEM



(57) Abstract: A ribbed module (10), security sign and security barrier (192) submergence system (100) to buoy and submerge structures for use with a module (10) having a buoyant structure so that a single module or a plurality of modules nested together can be ballasted (198) to a particular depth in any body of water, regardless of the temperature, salinity or other physical/chemical composition of the water.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/44751

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : E02B 3/04

US CL : 405/29, 26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 405/21, 23, 25, 26, 27, 29, 30, 31, 33, 35, 110, 111, 114, 116

Documentation searched other than minimum documentation to the extent that such documents are included in the fields
~~searched~~
NONE

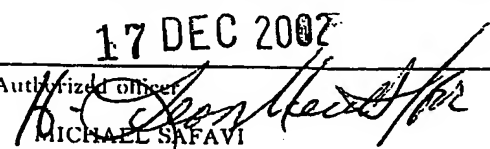
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| Y | US 3,864,920 A (TAZAKI et al.) (11 February 1975, Figs. 4 and 13. | 1-13 |
| Y | US 4,869,617 A (CHIODO) 26 September 1989, Figs. 1 and 5. | 1-13 |
| Y | US 5,879,105 A (BISHOP et al.) 09 March 1999, Figs. 1, 2, 12, and 14. | 1-13 |

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

| | | |
|---|-----|--|
| * Special categories of cited documents: | "I" | later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention |
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| Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 | Authorized officer  MICHAEL SAFAVI |
| Facsimile No. (703) 305-3230 | Telephone No. (703) 308-2168 |